

## Claims

- 1           1.     A computer-implemented method for monitoring variations in the film build  
2     thickness of workpieces on which a film build process has been performed, comprising  
3     the steps of:  
4                 measuring the film build thickness of a group of workpieces, the  
5     group comprising at least two subgroups of workpieces, each subgroup including at  
6     least two workpieces;  
7                 calculating the range of the film build thickness measurements of  
8     each subgroup, each range comprising the difference between the greatest thickness  
9     measurement and the least thickness measurement of the subgroup;  
10                selecting data from at least two of said subgroups having the  
11    smallest of the calculated ranges; and  
12                monitoring variations of the film build thickness of subsequent  
13    workpieces coated in the film build by processing the data from the selected subgroups.
- 1           2.     A method as defined in claim 1, including the step of calculating upper and  
2     lower control limits from the calculated ranges of the selected subgroups.
- 1           3.     A method as defined in claim 1, including the step of calculating upper and  
2     lower control limits for the film build process after each group of 20 subgroups has been  
3     measured.

1           4.     A method as defined in claim 1, including the step of calculating upper and  
2 lower control limits after the film build thickness of each additional subgroup has been  
3 measured, and including the latest 20 subgroups for selecting the subgroups having the  
4 smallest of the calculated ranges.

1           5.     A method as defined in claim 1, including the step of measuring the film  
2 build thickness of the corresponding surface area on a group of similar workpieces.

1           6.     A method as defined in claim 1, including the step of measuring the film  
2 build thickness of the corresponding surface area on a group of similar workpieces that  
3 have been coated with a film in the same painting booth.

1           7.     A method as defined in claim 1, including the step of measuring the film  
2 build thickness of the corresponding surface area on a group of similar workpieces that  
3 have been coated with a film in the same color group.

1           8.     A method as defined in claim 1, including the step of measuring the film  
2 build thickness of the corresponding surface area on a group of similar workpieces that  
3 have been coated within the same time frame.

1           9.     A method as defined in claim 1, including the step of calculating the  
2 change in quantity of film build material being used in the film build process by

3 substituting new process control limits for existing process control limits, the new  
4 process control limits having been calculated from the ranges of the selected  
5 subgroups.

1 10. A method as defined in claim 1, including the step of calculating the  
2 change in cost of film build material being used in the process by substituting new  
3 calculated process control limits for existing process control limits, the new process  
4 control limits having been calculated from the ranges of the selected subgroups.

1 11. A method as defined in claim 1, including the step of calculating  $C_{pk}$  based  
2 on the ranges of the selected subgroups.

1 12. A method as defined in claim 1, including the step of calculating a film  
2 build average thickness from data selected from the selected subgroups.

1 13. A method as defined in claim 9, including the steps of calculating the  
2 difference in  $C_{pk}$  for the new process control limits and the existing process control  
3 limits, and then calculating the change in film build material usage from the difference in  
4  $C_{pk}$ .